

THE USE OF SERUM BROMIDE
LEVELS AS AN INDICATOR
OF METHYL BROMIDE EXPOSURE

By

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The question of whether or not serum bromide levels can be used as an indicator of methyl bromide exposure has been asked on numerous occasions in the past. Acute and chronic methyl bromide intoxication syndromes are well described in the medical literature. Serum bromide levels in these conditions have limited value.

Gosselin, et. al. (1976) state that "no simple chemical tests are available for the diagnosis of methyl bromide poisoning." Dreisbach (1980) fails to make mention of blood bromide in his discussion of methyl bromide intoxication. Other reports, Collins (1965), show that symptoms from methyl bromide intoxication may be accompanied by blood bromide levels as low as 2.8 mg/100 ml of blood (28 ppm), or may be absent [Verberk, et. al. (1979)] with blood bromide levels as high as 23 mg/100 ml of blood (230 ppm). Death has occurred from methyl bromide poisoning which was accompanied by blood bromide levels of less than 10 mg/100 ml [Clarke, et. al. (1945)]. Rathus and Landy (1961) also discuss the lack of correlation between blood bromide concentration and clinical aspects of methyl bromide intoxication.

These facts all point to a lack of reliability of blood bromide in cases of methyl bromide poisoning and a lack of clinical correlation. Not to be disregarded is the effect dietary sources of inorganic bromides have on blood bromide levels. Inorganic bromide intoxication, however, is associated with much higher concentrations of bromide in the blood than intoxication from methyl bromide.

Blood bromide levels are commonly in the range of 1 mg/dl. Chronic exposure to methyl bromide in small non-acutely toxic doses does not result in an accumulation of bromide in the system. Acute exposures to methyl bromide will result in a temporary rise in blood bromide with a relatively rapid return to average standard levels. Persistent exposure to methyl bromide at levels which are not acutely toxic but which may produce chronic injury have not been associated with diagnostic levels of bromide in the blood. Prevention of chronic injury from methyl bromide is achieved through strict adherence to training of workers and insistence upon use of proper precautions, including utilization of personal protective equipment where indicated. Blood bromide determinations have not been useful in monitoring workers with repeated low exposures to methyl bromide.

Using blood bromide to evaluate the status of a group of employees in a given exposure situation may have some value. On an individual basis, however, following blood bromide in workers is not helpful since clinical correlation with biological intoxication does not exist. Interpretation of bromide levels measured in patients requires knowledge of exposure to all sources of bromide, as well as the history of any exposure to methyl bromide.

The primary problem clinicians face in dealing with possible over-exposures to methyl bromide is confusion between blood bromide levels associated with inorganic bromide as opposed to methyl bromide exposure. Clinicians frequently rely on 500 ppm (50 mg/dl) as the upper limit for blood bromide in assessing possible intoxication from methyl bromide. This is the upper limit associated with inorganic bromide exposures, above which overt toxicity usually occurs. Clinicians are not generally aware that much lower blood bromide levels can result even with extreme intoxication from methyl bromide. They should be made aware of this fact when evaluating patients who have definite exposure to methyl bromide at potentially toxic concentrations.